

STW7NA80 STH7NA80FI

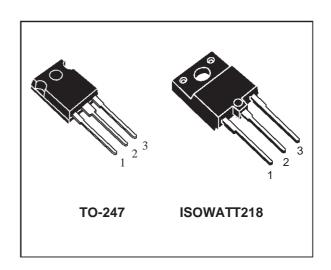
N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

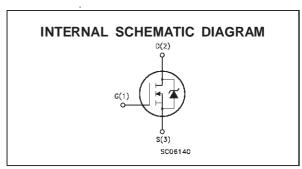
TYPE	V _{DSS}	R _{DS(on)}	I _D
STW7NA80	800 V	< 1.9 Ω	6.5 A
STH7NA80FI	800 V	< 1.9 Ω	4 A

- TYPICAL $R_{DS(on)} = 1.68 \Omega$
- ±30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE





ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Val	Unit	
		STW7NA80 STH7NA80FI		
V _{DS}	Drain-source Voltage (V _{GS} = 0)	80	00	V
V_{DGR}	Drain- gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	80	00	V
V _{GS}	Gate-source Voltage	± :	30	V
I _D	Drain Current (continuous) at T _c = 25 °C	6.5	4	Α
I _D	Drain Current (continuous) at T _c = 100 °C	4	2.5	Α
I _{DM} (•)	Drain Current (pulsed)	26	26	Α
P _{tot}	Total Dissipation at T _c = 25 °C	150	60	W
	Derating Factor	1.2	0.48	W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	_	4000	V
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature	15	60	°C

^(•) Pulse width limited by safe operating area

October 1998 1/10

THERMAL DATA

			TO-247	ISOWATT218	
R _{thj-case}	Thermal Resistance Junction-case	Max	0.83	2.08	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	30)	°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Тур	0.1	1	°C/W
T ₁	Maximum Lead Temperature For Soldering P	urpose	30	0	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$)	6.3	А
E _{AS}	Single Pulse Avalanche Energy (starting $T_i = 25$ °C, $I_D = I_{AR}$, $V_{DD} = 50$ V)	320	mJ

ELECTRICAL CHARACTERISTICS ($T_{case} = 25$ $^{\circ}C$ unless otherwise specified)

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Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	$I_D = 250 \ \mu A$ $V_{GS} = 0$	800			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	$V_{DS} = Max Rating$ $V_{DS} = Max Rating$ $T_c = 100 ^{\circ}C$			25 50	μΑ μΑ
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	$V_{GS} = \pm 30 \text{ V}$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250 \mu A$	2.25	3	3.75	V
R _{DS(on)}	Static Drain-source On Resistance	$V_{GS} = 10V I_{D} = 3.5 \text{ A}$		1.68	1.9	Ω
I _{D(on)}	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10 \text{ V}$	7			А

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
g _{fs} (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 3.5 \text{ A}$	4.5	6.3		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25 \text{ V}$ f = 1 MHz $V_{GS} = 0$		1330 160 40	1750 210 55	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{d(on)} t _r	Turn-on Time Rise Time	$V_{DD} = 400 \text{ V}$ $I_D = 3.5 \text{ A}$ $R_G = 47 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 3)		3.5 9.5	45 125	ns ns
(di/dt) _{on}	Turn-on Current Slope	$V_{DD} = 640 \text{ V}$ $I_D = 7 \text{ A}$ $R_G = 47 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 5)		170		A/μs
Q _g Q _{gs} Q _{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 640 \text{ V}$ $I_{D} = 7 \text{ A}$ $V_{GS} = 10 \text{ V}$		58 8 27	78	nC nC nC

SWITCHING OFF

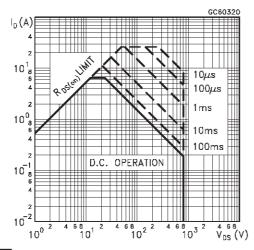
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{r(Voff)}	Off-voltage Rise Time	$V_{DD} = 640 \text{ V} I_{D} = 6 \text{ A}$		90	120	ns
t _f	Fall Time	$R_G = 47 \Omega V_{GS} = 10 V$		25	35	ns
tc	Cross-over Time	(see test circuit, figure 5)		125	165	ns

SOURCE DRAIN DIODE

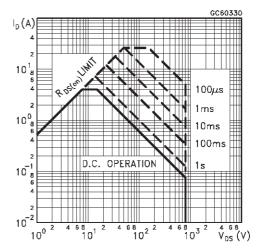
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I _{SD} I _{SDM} (•)	Source-drain Current Source-drain Current (pulsed)				6.5 26	A A
V _{SD} (*)	Forward On Voltage	I _{SD} = 7 A V _{GS} = 0			1.6	V
t _{rr}	Reverse Recovery Time	$I_{SD} = 7 \text{ A}$ di/dt = 100 A/ μ s $V_{DD} = 100 \text{ V}$ $T_i = 150 \text{ °C}$		850		ns
Qrr	Reverse Recovery Charge	(see test circuit, figure 5)		15		μС
I _{RRM}	Reverse Recovery Current			35		A

^(*) Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %
(•) Pulse width limited by safe operating area

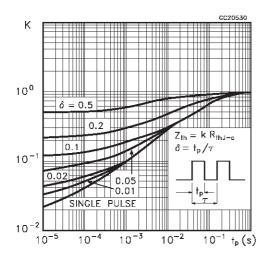
Safe Operating Area for TO-247



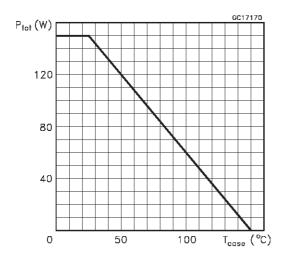
Safe Operating Area for ISOWATT218



Thermal Impedance for TO-247

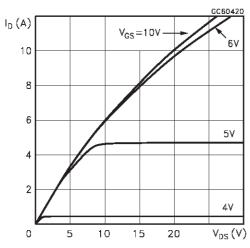


Derating Curve for TO-247

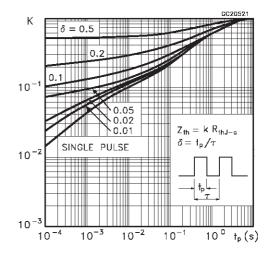


Output Characteristics

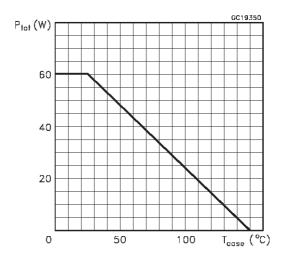
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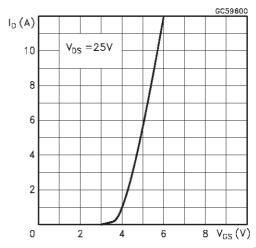
Thermal Impedance for ISOWATT218



Derating Curve for ISOWATT218

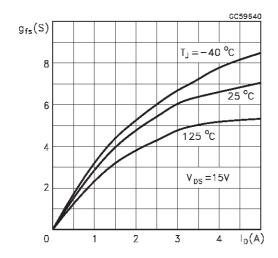


Transfer Characteristics

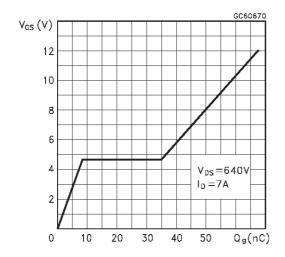


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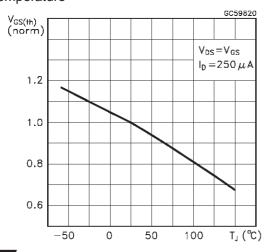
Transconductance



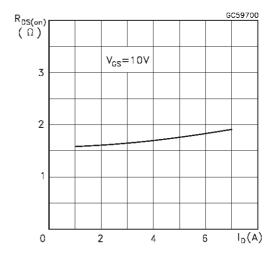
Gate Charge vs Gate-source Voltage



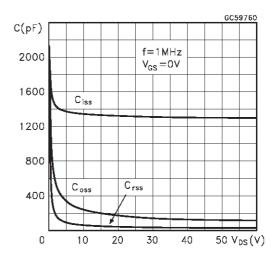
Normalized Gate Threshold Voltage vs Temperature



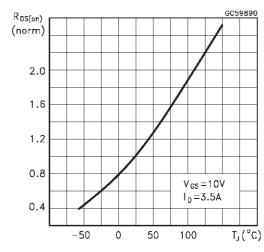
Static Drain-source On Resistance



Capacitance Variations

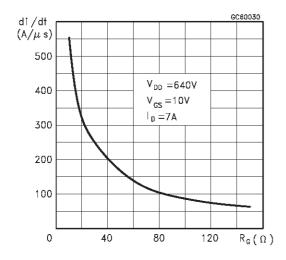


Normalized On Resistance vs Temperature

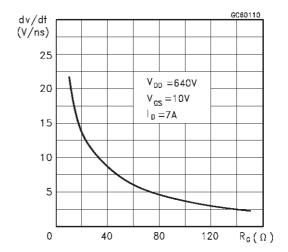


STW7NA80-STH7NA80FI

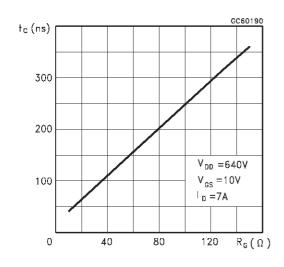
Turn-on Current Slope



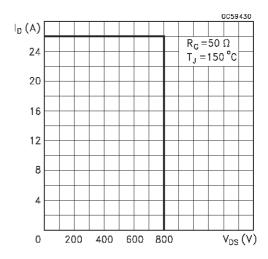
Turn-off Drain-source Voltage Slope



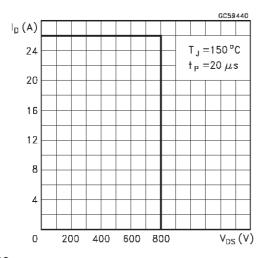
Cross-over Time



Switching Safe Operating Area



Accidental Overload Area



Source-drain Diode Forward Characteristics

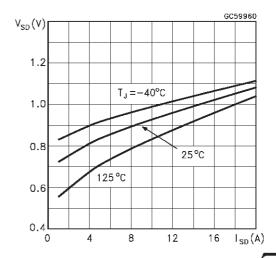


Fig. 1: Unclamped Inductive Load Test Circuit

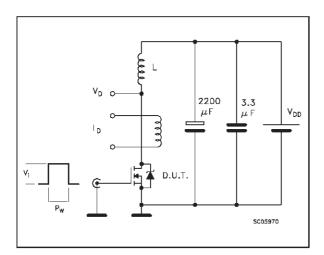


Fig. 3: Switching Times Test Circuits For Resistive Load

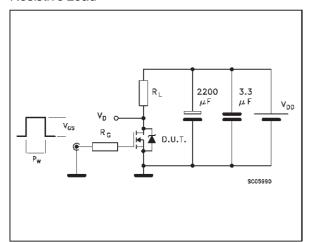


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

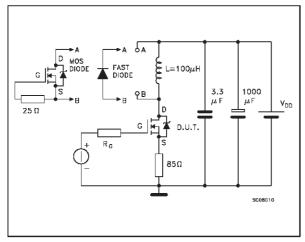


Fig. 2: Unclamped Inductive Waveform

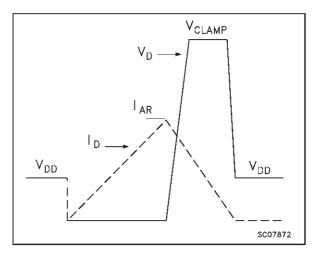
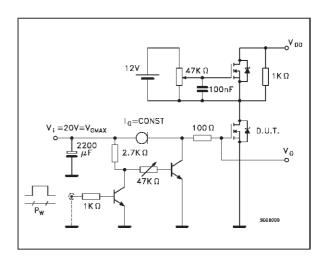
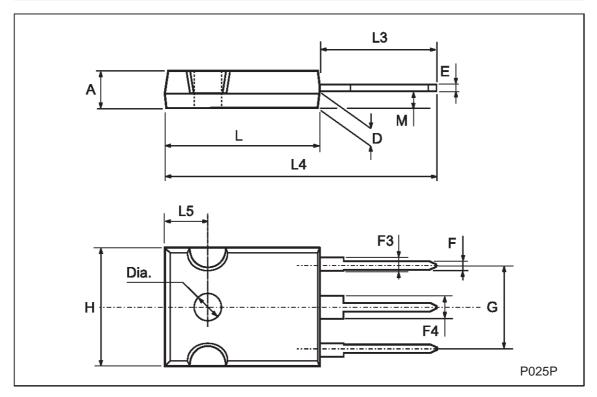


Fig. 4: Gate Charge test Circuit



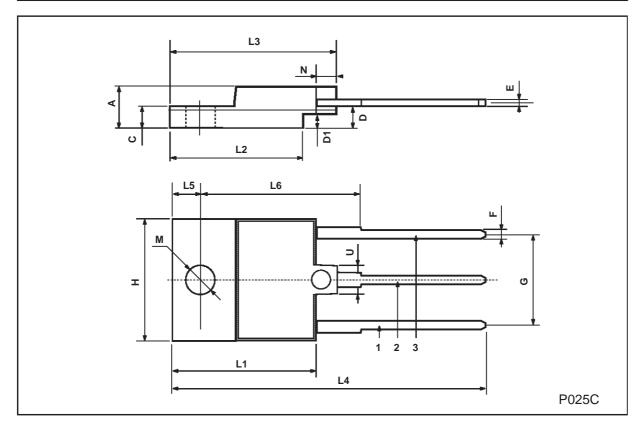
TO-247 MECHANICAL DATA

DIM.		mm			inch	
Diwi.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
Е	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
Н	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559	0.413	0.582
L4		34.6			1.362	
L5		5.5			0.217	
М	2		3	0.079		0.118
Dia	3.55		3.65	0.140		0.144



ISOWATT218 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	5.35		5.65	0.210		0.222
С	3.3		3.8	0.130		0.149
D	2.9		3.1	0.114		0.122
D1	1.88		2.08	0.074		0.081
E	0.75		1	0.029		0.039
F	1.05		1.25	0.041		0.049
G	10.8		11.2	0.425		0.441
Н	15.8		16.2	0.622		0.637
L1	20.8		21.2	0.818		0.834
L2	19.1		19.9	0.752		0.783
L3	22.8		23.6	0.897		0.929
L4	40.5		42.5	1.594		1.673
L5	4.85		5.25	0.190		0.206
L6	20.25		20.75	0.797		0.817
М	3.5		3.7	0.137		0.145
N	2.1		2.3	0.082		0.090
U		4.6			0.181	



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